## REMARKS

The present invention is directed to the method for producing gas engine oil which exhibits enhanced life, as evidenced by a reduction in at least one of viscosity increase, oxidation increase, nitration increase, TAN increase and TBN depletion, said gas engine oil comprising a base oil having a viscosity at 100°C between 9 to 13 cSt, about 0.1 to 2 vol% phenolic antioxidant as the only antioxidant, about 0.2 to about 0.5 vol% anti-wear additive and an amount of viscosity index improver which is not sufficient to produce a multi-grade gas engine oil lubricating composition, the amount of viscosity index improver being in the range of about 0.1 to 3 vol%, and a minor amount of low ash gas engine oil detergent system having a TBN of about 50 to about 300, wherein the gas engine oil has a low ash content in the range of 0.1 to 0.6 wt% and wherein the enhancement of the life of the gas engine oil is in comparison to single grade gas engine oils which do not contain both phenolic antioxidant(s) and viscosity index improver(s).

The Examiner rejects claim 6, 9, 13 and 14, all the claims remaining in the case, under 35 U.S.C. § 103(a) as obvious over Blahey (USP 5,726,133).

The Examiner argues that Blahey teaches a low ash natural gas engine oil and additive system comprising a lubricating oil base stock having a KV at 100°C of about 5 to 16 cSt, a minor amount of a detergent comprising a mixture of a low TBN alkali or alkaline earth metal salt and at least one more neutral alkali or alkaline earth metal salt, a viscosity index improver (VII) and an antioxidant (abstract, column 2, lines 1-11, 25-27). The detergent is used in an amount contributing 0.1 to 0.6% sulfated ash. The phenolic antioxidant is present in the composition in an amount from 0.05 to 1.5 vol%, the VII in amounts up to 15 vol%, the anti wear agent in amounts from about 0.05 to 1.5 vol%.

The Examiner notes that Blahey does not specifically teach that the amount of VII present in the composition will not produce a multi-grade gas engine oil but deems that difference obvious.

The Examiner argues that Blahey characterizes the VII as imparting multi-functional viscosity properties to the finished oil, not necessarily multi-grade viscosity but multifunctional from the perspective of offering secondary lubricant performance features such as additional dispersancy.

The Examiner goes on to argue that both Blahey and present applicant use the same additive package, commercial additive Oloa 1255 which imparts about 0.4 vol% phenolic antioxidant. The Examiner concludes that because Blahey and the present applicant both use Oloa 1255 it would be reasonable to expect that Blahey uses only phenolic antioxidant and that the oils of his invention would exhibit enhanced life, and that it would also be reasonable to expect that the amount of the viscosity index improvers would not be present in the oil in an amount that produce a multi-grade engine oil composition because Blahey's VII's are multifunctional not necessarily multi-grade functional.

Applicants respectfully traverse this rejection.

The present invention is directed to the discovery of a method for enhancing the life of gas engine oils as evidenced by a reduction in at least one of viscosity increase, oxidation, nitration, TAN increase, and TBN depletion of the gas engine oil during use comprising formulating a gas engine oil comprising a base stock having a KV at 100°C between 9 to 13 cSt, from 0.1 to 2 vol% of a phenolic antioxidant, about 0.2 to 0.5 vol% antiwear additive, 0.1 to 3 vol% viscosity index improver in an amount not sufficient to produce a multi-grade gas engine oil, and a minor amount of a gas engine oil detergent system having a TBN of about 50 to 3000 resulting in a low ash content of 0.1 to 0.6 wt%, wherein the life of said gas engine oil is enhanced in comparison to gas engine oils which do not contain <u>both</u> phenolic antioxidants (as the only antioxidants) and a viscosity index improver.

The Examiner interprets Blahey '133 as teaching multifunctional VII's as not necessarily viscosity index improvers which result in the oil being multi-grade.

This is a misreading of Blahey. While multi-functional indeed refers to viscosity index improver exhibiting multiple functionality performance, e.g., not only increasing viscosity index but also positively effecting dispersancy, etc., it is not the multi-functional property or the mono-functional property of the viscosity index improver which determines whether the oil composition is mono-grade or multi-grade. The use of multi-functional VII's do not necessarily imply that the resulting oil is a multi-grade oil or a mono-grade oil.

Mono-functional viscosity index improvers are equally capable of imparting mono-grade or multi-grade viscosity characteristics to oils just as multi-functional viscosity index improvers when added to oils can result in mono-grade oils or multi-grade oils. Whether the oil formulation is a mono-grade or multi-grade oil formulation depends on the amount of viscosity index improver used, not on whether the viscosity index improver is or is not multi-functional.

Multi-grade viscosity properties are imparted by the amount of viscosity index improver used. Multi-grade viscosity is not a functionality imparted by a viscosity index improver as a consequence of it having additional substituents making it multi-functional.

Thus, Blahey in his use of a multi-functional viscosity index improver is seeking to impart secondary features and to also achieve his stated objective of producing a multi-grade viscosity oil. Blahey states that he uses a viscosity index improver to impart multi-grade viscosity characteristics to the oil (see column 2, lines 26-27). This is achieved by using a sufficient amount of the viscosity index improver, up to 15 vol%, preferably up to 13 vol%, most preferably up to 10 vol%.

To repeat multi-grade viscosity is not a secondary functionality given to the oil simply by the use of a multi-functional viscosity index improver but by the addition of a sufficient amount of viscosity index improver, be it mono-functional or multi-functional.

Thus, by reciting that the object is to impact multi-grade viscosity characteristics to the oil (column 2, lines 26-27), the Blahey reference is indicating that a sufficient amount of the VII is being added to achieve multi-grade viscosity along with the secondary performance features which are associated with any substituents present on the VII making it multi-functional.

The observation by the Examiner that the reference oil in Blahey uses Oloa 1255 and that the oils in the present invention similarly use Oloa 1255 and the oils therefore must be the same, misses the significant differences between the reference and the present invention.

Oloa 1255 is a commercial additive package that imparts about 0.4 vol% phenolic antioxidant to the oil.

Oil #10 of Table 1 is a formulation containing Oloa 1255 and 1.0 vol% added phenol-2 antioxidant. Thus Oil #10 contains only phenolic antioxidant, but no viscosity index improver of any kind.

This is to be compared against Oil #11 and Oil #13 which both contain Oloa 1255 plus 1.00 vol% phenol-2 AO as antioxidant but also 0.75 vol% mono-functional VII and 0.70 vol% multi-functional VII respectively.

Both Oil #11 and Oil #13 are superior to Oil #10 in terms of % viscosity increase, oxidation, Tan delta, and equivalent in terms of nitration and TBN (% depleted).

Thus, it is not the use solely of only a phenolic antioxidant which results in enhanced performance but the use of both phenolic antioxidant and viscosity index improvers which result in enhanced performance.

While Blahey states that other additives may be present such as

a dispersant to enhance engine cleanliness;

a supplementary antioxidant to extend oil life (which may be either or both phenolic and aminic antioxidant, no preference being stated);

an anti-wear additive;

a metal deactivator;

an antifoam additive;

a pour point dispersant; or

a viscosity index improver to impact multi-grade viscosity characteristic (col. 2, lines 14-2), this list is only a recitation of permissible additional additives, not a recitation of additives actually necessarily present in any of the oils exemplified either as reference oils or oils of the patent.

Thus, in Table 1 of Blahey oil 1 is a reference oil and it contains only Oloa 1255 and is therefore closely related to Oil #10 of the present text, an oil only containing phenol antioxidant. There is no way to determine from Blahey's Table 1 whether the reference oil containing Oloa 1255 did or did not contain a viscosity index improver or achieved its target viscosity through the use of a heavy base oil component. Thus, it cannot be presumed that it contained any VII nor the amount. In this regard, therefore it is like Oil #10 of the present text which contained 9.6 vol% Oloa 1255, 1 vol% additional phenol only antioxidant and no viscosity index improver.

That being the case it is clear that the present application disclose a patentable invention as demonstrated by Oils #11 and #13 over Oil #10.

It is requested that the Examiner reconsider this application in light of the above remarks that the rejection be withdrawn, the claims allowed and the case passed to issue in due course.

Respectfully submitted,

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